

Eric Witten  
06-4-3

April 20, 2006

Sunne Wright McPeak  
Secretary  
Business, Transportation & Housing Agency  
980 9th Street, Suite 2450  
Sacramento, CA 95814-21719

Chairman Sawyer  
Members of the Board  
California Air Resources Board  
1000 I Street  
Sacramento, CA 95814

Dear Secretary McPeak and Chairman Sawyer:

Wittmar Engineering & Construction, Inc is grateful for the opportunity to comment and participate in the Goods Movement Action Plan (Plan) of the California Environmental Protection Agency and the Business, Transportation & Housing Agency. We are an engineering and construction company that specializes in energy analysis, and self-generation for industrial facilities throughout California. We also are pioneers in cold ironing technologies via our patented Dual-Frequency Multi-Voltage (DFMV) generation system. Wittmar was founded by life-long Long Beach residents and we are located in Signal Hill, California.

We would like to add the following to our comments submitted on April 19, 2006:

**Encourage technologies which reduce NOx and PM emissions over single pollutant technologies**

The Goods Movement Action Plan (Plan) "is an essential component of California's effort to reduce community exposure to air pollution and to meet new federal air quality standards for **ozone** and fine **particulate matter** (PM)." It is important to encourage technologies which can reduce the primary precursor to ozone (NOx) emissions as well as reduce PM emissions from diesel engines. Thus, technologies such as alternative diesel fuels, which reduce both harmful pollutants from diesel engines, should be preferred over technologies which only reduce one of these dangerous pollutants.

Alternative diesel fuels include water-diesel emulsified fuel, biodiesel fuel, ethanol-diesel-emulsified fuel and Fischer Tropsch fuel. Several products have been CARB verified and reduce both PM and NOx emissions in diesel engines. Except in the case of ethanol-diesel-emulsified fuel, each of these products reduced NOx by at least 14% and PM at least 50%. When there is a decision pertaining to what is the "Best Available Control Technology" for Port equipment, alternative diesel fuels, which reduce NOx and PM, should be considered BACT. Additionally, alternative diesel fuels do not negatively impact fuel consumption (on an energy bases) like most add-on technologies. In fact, due to the water in these products, the combustion process is greatly improved. The vaporization of water in the diesel combustion chamber disperses the fuel into smaller drops while increasing the contact surface area between fuel and air. Overall carbon emissions should then also be reduced due to the combustion improvement as well as the use of organically derived surfactants. Alternative diesel fuel technology could also become the medium to further reduce carbon, NOx and PM emissions by emulsification of biodiesel.

**Include Alternative Diesel Fuel as Strategy in all categories in Table 3**

This would include amending table 3 "List of Strategies to Reduce Emissions from Port and Goods Movement" by adding alternative diesel fuel as a "new strategy" in the following categories:

1. Commercial Harbor Craft;
2. Cargo Handling Equipment;
3. Trucks; and

#### 4. Locomotives.

Alternative diesel fuels will work in each of these applications without modification to the engine.

#### Encourage compliance innovation

For example, an aggressive alternative diesel fuel strategy for trucks within the port could be quickly implemented at very little cost, while allowing "green" truckers the ability to generate more income. It could be implemented in a fashion similar to a HOV lane. The Ports would issue "decals" to users of CARB verified alternative diesel fuels. The Decal owner would be allowed to move to the front of the cargo "pick up" line. The Ports would benefit by cost effectively encouraging the use of cleaner fuels, while the operators would benefit by decreasing idle time between pick ups and increasing potential income per day.

#### Cold Ironing

Develop specific regulations pertaining to "cold ironing" which encourage flexible, modular, low emission, adaptable options to power ships while being off-loaded in California Ports. Ships have different configurations for the wheel house; some are at the bow, some are at the stern and some are amidships. Therefore, a "Cold Ironing" system should be modular. A modular system accommodates any ship configuration and can be located on the dock to minimize the impact to the loading and unloading process. This also means that Cold Ironing regulations should to be flexible to deal with the different power requirements of various ships that come into our ports. Please refer to the attached "Wittmar Engineering & Construction Inc. DFMV Cold Ironing System™ presentation which details specific requirements to implement a cost effective "Cold Ironing" program in our Ports.

In summary, we commend the State of California for actively trying to reduce harmful NOx and PM emissions. However, it must be done through flexible regulations which encourage innovation. The terminal operator, shipping company, private rail yard or private truck owner will incur the additional operating or capital costs to reduce emissions to move goods in California. It is vital that alternative diesel fuel and modular "cold ironing" technologies are accorded consideration as the most effective strategies to reduce harmful emissions in our Ports.

Sincerely,



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**WITTMAR  
ENGINEERING & CONSTRUCTION INC.**

**DFMV COLD IRONING SYSTEM™**

**INTRODUCTION AND PRESENTATION**

**CALIFORNIA AIR RESOURCES BOARD  
PUBLIC CONSULTATION MEETING  
SACRAMENTO, CALIFORNIA**

**November 9, 2004**

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## The Basic Description of the Wittmar DFMV Cold Ironing System™

The WittMar Engineering & Construction, Inc. DFMV Cold Ironing System™ is designed specifically to address the issue of deep draft, ship based air pollution. The system was developed to be flexible, modular, adaptable, low cost and meet existing environmental expectations within a reasonable time frame.

The DFMV System™ is a patent pending system specifically designed to deliver shore based electrical power to ships while docked. The DFMV System™ utilizes a turbo charged natural gas or LPG engine to generate the electricity. The engine is specially designed and engineered to generate either 50 Hz or 60 Hz and 380 volts to 480 volts so that it can be utilized with any ship that may call on the port complex. A true Dual Frequency Multi Voltage generator for the strict purpose of cold ironing deep draft ships.

The DFMV System™ is modular. Positioning on the dock is not fixed, thus accommodating ships of any length or configuration is assured. Ships have different configurations for the wheel house. Some are at the bow, some are at the stern and some are amidships. A modular system accommodates any ship configuration. Another advantage of a modular system is that it can be located on the dock and minimize any impact to the loading and unloading process.

The DFMV System™ utilizes BACT and reduces air pollution in excess of 95% when compared to bunker fuel pollution. Utilization of the Wittmar DFMV System™ will convert ship based pollution to shore based pollution and allow the shore based operators to become regulated in the same fashion that all other industries in California are currently regulated. The issue of foreign flagged vessels can be overcome because the shore side operators are not foreign flagged and the control over the pollution is clearly within the jurisdiction of the California Air Resources Board. The RECLAIM rules can be applied and the shore based operators can be fully integrated into the pollution control system that exists today. Some minor rules modification may be needed for engine size and CEMS requirements.

The DFMV System™ can be installed within 6 months at a cost that is less than the SCAQMD economic criteria for investment cost. **No port infrastructure modification is required. No tax dollars are required.**

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## **The Wittmar DFMV System™ Addresses Many Issues That are Hurdles to Cold Ironing In 2004**

- ❖ Huge Port Infrastructure investments are eliminated
- ❖ Lengthy delays for construction of infrastructure are eliminated
- ❖ Economic impact of the loss of a berth while the infrastructure is built is eliminated
- ❖ Potential loss of jobs during infrastructure improvements are eliminated
- ❖ Minimum levels of Cold Ironing can be achieved with no vessel retrofit costs
- ❖ Work barges are unnecessary
- ❖ Power cost is lower than the standard SCE TOU 8 electric rate
- ❖ Fuel cost is nearly an offset expense because the ship board generator is shut down
- ❖ Cost effectiveness criteria is met
- ❖ High paying jobs are created
- ❖ Tax dollars are not needed
- ❖ More types, sizes and shapes of ships are candidates for cold ironing without any ship modifications
- ❖ Ships that don't call on a port frequently can still be cold ironed to some degree without ship based modifications.
- ❖ The issue of mandated cold ironing and international, federal state and local jurisdiction is easily resolved because the mandate for pollution mitigation can be placed on the shore side operator and not on the ship, thus creating the situation where the shore based operator is treated like all other pollution emitters in the State of California
- ❖ RECLAIM can be utilized to foster growth of cold ironing and improve the technology without utilizing tax dollars
- ❖ Work can begin immediately

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## WORLD ELECTRICITY - VOLTAGE AND FREQUENCY

COUNTRY	SINGLE PHASE	THREE PHASE	FREQUENCY
Argentina	220	380/440	50 Hz
Australia	240/415	415	50 Hz
Belgium	220	400	50 Hz
Canada	120/240	240	60 Hz
Chile	220/380	380	50 Hz
China	220	380	50 Hz
Costa Rica	120/240	240	60 Hz
Denmark	220/380	380	50 Hz
France	220	380	50 Hz
Germany	230	400	50 Hz
Greece	220	380	50 Hz
Guatemala	120/240	240	60 Hz
Hong Kong	200	346	50 Hz
India	220	380	50 Hz
Italy	127	220	50 Hz
Japan	100/200	200	50 Hz
Korea	110/220	380	60 Hz
Malaysia	240	415	50 Hz
Mexico	127/220	220	60 Hz
Netherlands	220	380	50 Hz
New Zealand	230/400	400	50 Hz
Philippines	110/220	220	60 Hz
Singapore	230	400	50 Hz
Taiwan	110/220	220	60 Hz
United Kingdom	230	415	50 Hz
USA	120/240	240	60 Hz

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## **Site Plan**

Modular, Flexible, Workable, Safe and Efficient

## **Operation of the Wittmar DFMV System™**

Natural Gas via pipeline, LNG, LPG

## **Component Description**

50Hz or 60 Hz and 380 to 480 Volts

## **Retrofits**

Not Required for Immediate Implementation

## **Air Pollution Benefits**

BACT

## **Partial and Complete Cold Ironing**

Adaptable and Expandable

## **POLA Barge Based System**

- ❖ Compare to DFMV System™
- ❖ Contrast to DFMV System™

## **Costs**

- ❖ POLA spent in about \$10,000,000 and more than 1 year to construct the China Shipping Dock cold ironing system
- ❖ Wittmar DFMV System™ will cost less than \$1,500,000 and will be available in no more than 6 months after the order is received.

## RECLAIM

Utilization of the RECLAIM market incentive program will allow port facility operators flexibility in achieving emission reduction goals (requirements) for NOx and SOx and concurrently PM. The port facility is essentially a stationary air pollution source, allowing operators to join RECLAIM will foster the development of the following:

- ❖ Adjust and develop new operating procedures that promote and foster the minimization and elimination of air pollution. An example of one such change in operating procedure, the loading and unloading of reefers, is discussed below.
- ❖ Coordinate with ships that are calling at a specific port facility to devise and implement ship based operating procedures to eliminate and minimize air pollution.
- ❖ Utilize and expand the use of generation systems that use alternative fuels.
- ❖ Utilize and expand the use of operating procedures that minimize and eliminate air pollution from site based sources.
- ❖ Expand the use of alternative fuels in equipment operated by the port facility operator.
- ❖ Provides an incentive for the port operator to demand the use of alternative fuels in trucks picking up and delivering cargo.
- ❖ Does not require new rules. Some modifications to existing area RECLAIM rules would be beneficial. An example of a rule modification is the elimination of a CEMS unit for Cold Ironing Systems over 1000 hp (SCAQMD rule). The technical hurdles for a mobile CEMS unit are an impediment to immediate deployment of Cold Ironing over 1000 hp. Also, allowing the use of larger engines can increase the scope and range of Cold Ironing and increase the variety of ships that can be successfully Cold Ironed. Another example would be adjusting the rules so that port facilities are stationary sources since the air pollution that is created is stationary when viewed from a district or state wide perspective. For example, the forklifts never venture past the fenced area of the port facility.
- ❖ Advances air pollution mitigation goals without the use of tax dollars.
- ❖ Provides incentives and demand for new technology such as fuel cells, alternative fuels and retrofit technologies that does not exist today.
- ❖ Profit from trading activities



## **Standard Operating Procedures – Changes can be Made to Assist the Implementation of Cold Ironing**

In the Port of Long Beach "Cold Ironing Cost Effectiveness Study" the MV Hanjin Paris was used as one of the "baseline" ships.

The MV Hanjin Paris has an installed generation capability of 7.6 MW. The ship has a capacity of 500 TEU refrigerated containers and 5300 ordinary containers. Assuming that all 500 TEU's were refrigerated with Carrier Transicold systems then the maximum electricity required for the reefers would be 5.275 MW, or 10.55 kW for each Carrier Transicold at maximum cooling. The difference between the maximum generation of 7.6 MW and 5.275 MW is backup and hotelling.

In the Port of Long Beach Study, Environ found that the Hanjin Paris was normally unloaded and loaded in 63 hours. The longshoreman can process 184 containers per hour. Therefore, if the port facility operator coordinated with the longshoreman and the ship they could unload all of the reefers in less than 3 hours. Coordinating further, the longshoreman could load the outbound reefers in the last 3 hours. This change in operating procedure would mean that the ship would only need hotelling power during the remaining 57 hours or 90.5% of the time at berth. A Wittmar DFMV System™ can supply that power with clean burning LNG

The Port of Long Beach Study wrongfully assumes that the Hanjin Paris needs 7.6 MW while at berth. In fact, the Hanjin Paris needs far less electricity to cold iron. It is very conceivable that Hanjin Paris does not have any reefers on board or has only a partial load of reefers. The Wittmar DFMV System™ could effectively cold iron the ship.

When the port facility operators are in RECLAIM operating procedures like the described above can easily foster significant change.

In the case of the Hanjin Paris utilizing the Wittmar DFMV System™ and changing the Standard Operating Procedure to unload reefers first and reload reefers last can reduce air pollution significantly. In some cases where there are very few or there aren't any reefers the goal of full and complete cold ironing can be realized. This could even be achieved without any modification to the Hanjin Paris.

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## Regulatory Role

- ❖ Establish rules that are specific for Cold Ironing and allow innovation and advancement by fostering the research and development. Allow innovation.
- ❖ Recognize that infrastructure costs for complete Cold Ironing is going to be huge if the only allowable direction is full Cold Ironing. The POLA reportedly spent \$10,000,00 to electrify the China Shipping terminal. In the POLB there are 30 port facility operators.
- ❖ Develop a position on Cold Ironing that starts "small" and works up to "complete" Cold Ironing. The health benefits of partial Cold Ironing are valuable. Partial Cold Ironing can begin today. Utilize a time frame that will keep progress moving forward. The operating environment to Cold Iron is very complex and there needs to be a time frame for the incubation of new ideas, procedures and technologies to take hold and develop.
- ❖ Allow the determination of air pollution reductions to be quantified by the type and quantity of alternative fuel that was actually used. On board ship generators have a manufacturers' specification of the amount of fuel that is required to generate a specific quantity of electricity. Shutting the on board ship generator down and utilizing the Wittmar DFMV System™ is then the use of an alternative fuel and the air pollution reduction is the quantity that would have been produced with bunker fuel minus that which was produced with the Wittmar DFMV System™. This is the initial air pollution baseline for Cold Ironing. Periodic testing of the bunker fuel created pollution can be required to update the baseline. The Wittmar DFMV System™ meets BACT and would be permitted and source tested according to existing rules. This rule perspective eliminates the need to retrofit a ship to measure pollution.
- ❖ Recognize the wide variety of ships and ship systems, government jurisdictions, charterers and owners that make up the fleet of deep draft shipping in the world. Whenever changes, additions or modifications must be made in the air regulations understand that in all cases the chances that the goal of reducing and eliminating ship based air pollution will be more successful if the focus of those rules is on the port facility operator.
- ❖ Use RECLAIM. If necessary develop a PORT OPERATIONS RECLAIM. The use of RECLAIM is a very powerful tool that will have direct and immediate benefits. The RECLAIM program has a proven track record of success. RECLAIM fosters technology, creativity, compliance and success.
- ❖ Cold Ironing regulations that are focused on the port facility operator are the most fair. The port facility operator is then treated like any other industrial facility in

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California. Some of the benefits and features leading to **regulatory success** that will be realized by regulating the port facility operator in stead of the municipality are:

- The port facility operator has control over the equipment to load, unload and move freight.
  - The port facility operator has control over the operating procedures that are used to unload and load ships.
  - Different technologies and solutions will be applied by different port facility operators there by developing a new market and new ideas for solutions. Better and better technologies and solutions will "bubble up".
  - Requiring the Municipal Port Governing Authorities to Cold Iron will require huge investments in infrastructure and huge outlays of tax dollars to develop a one size fits all approach. After the Municipality selects a direction then the advancements in new technology will be muted because the direction has been selected and change will be all but impossible.
  - Requiring the Municipal Port Governing Authorities to implement Cold Ironing will surely result in lawsuits, higher costs, delays and possibly even the failure to clean up the air in our ports.
  - Port facility operators are private businesses and they can react and adjust to changes in procedures, technologies and economics much quicker than Municipal Authorities. The likelihood that air pollution mitigation will be achieved is much greater.
  - Port facility operators can employ multiple and different technologies that "fit" their business. The combination of technologies can achieve much more than a "one size fits all" mandated solution.
- ❖ The United States EPA has determined that the Clean Air Act only gives the agency authority to set emission standards for new marine engines, leaving the regulation of the use and operation of marine engines to state and local government. The Wittmar DFMV System™ is the technology that the California Air Resources Board needs to effectively regulate the use and operation of marine engines.
  - ❖ Developing rules and regulations that recognize and foster a process of technological growth and innovation, that are not affected by international agreements, opposed by ship owners, require huge outlays of tax dollars, risks the loss of jobs, create litigation nightmares, and are years away will be the most direct path to achieving clean air in our ports. Encouraging new technologies such as the Wittmar DFMV System™ will clean up our air today.
  - ❖ The Wittmar DFMV System™ meets SCAQMD BACT. Fostering a technology such as the Wittmar DFMV System™ will allow the California Air Resources Board to meet its commitments to the Burke amendment.

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## Budget and Timing

- ❖ 6 months to construct and deliver once a purchase order is signed
- ❖ Estimated cost to deliver a complete ready to use system is \$1,500,000. Once a customer is identified and the specific location is selected the final price is expected to be less.
- ❖ Wittmar Engineering & Construction, Inc. expects to lease the systems to the port facility operator. This will minimize the economic impact on the port facility operator by requiring an initial payment of first month and last month up front. Wittmar will be able to properly operate the system to assure successful Cold Ironing.
- ❖ Initial payment to Wittmar will be about \$71,000.00. Wittmar will build the entire system, provide financing, construction management and all permitting.
- ❖ The monthly payment for the capital portion only (no fuel, no connect/disconnect service and no maintenance) will be about \$34,000 for a 48 month lease.
- ❖ Wittmar will provide connect / disconnect service, fuel and maintenance for an additional fee.

## Economics

The Wittmar DFMV System™ can operate 24 hours per day 7 days per week. Most facilities do not have a ship at berth for that period of time. For the purpose of this evaluation assume that the Wittmar DFMV System™ is utilized 5 days per week. The only pollutant that will be considered is NOx. The NOx reduction is between diesel and LNG values.

- ❖ Each Wittmar DFMV System™ reduces NOx by 2,090 pounds per week
- ❖ Each Wittmar DFMV System™ reduces NOx by 4.18 tons per month
- ❖ The capital lease costs are \$34,000 per month
- ❖ The labor costs for 2 men full time per unit is \$28,800 per month.
- ❖ The maintenance cost is \$345 per week

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- ❖ Total monthly expense is \$64,180
- ❖ \$15,354 per ton of NOx, **non discounted**. This is less than the weighted average cost effectiveness sighted in the POLB Cold Ironing Study.
- ❖ Over a 10 year project life the cost per ton on NOx only, non discounted and holding costs flat yields a cost per ton of \$14,173 per ton NOx.
- ❖ The Carl Moyer Program has a limit of \$13,600 per ton NOx.
- ❖ If 2 Wittmar DFMV System™ are deployed then the cost per ton decreases because the labor is more efficiently utilized and the cost is spread over 2 systems.
- ❖ With 2 Wittmar DFMV Systems™ deployed the cost per ton for NOx reduction over a 10 year life is \$10,688 per ton NOx non discounted and on a flat basis.
- ❖ A cost benefit not included would come from the value of trading RECLAIM credits. On June 2, 2004 SC NOx RTC's for 2005 were trading at \$3.40 per pound. Trading these credits would yield a revenue of \$28,424 for the month.
- ❖ When applying the value of RTC's, then the cost per ton of NOx for the Wittmar DFMV System™ is \$8,554. Well below currently acceptable thresholds for pollution control investments.

As Wittmar deploys more DFMV Systems™ the cost per unit and the cost of labor will drop. More ships, barge tow vessels, and vessels at anchor are cost effective candidates for Wittmar DFMV System™.

## Intellectual Property Rights

1. The Wittmar DFMV Cold Ironing System™ and an associated business model to cold iron deep draft marine vessels for the purpose of mitigating air pollution is Patent Pending.
2. The Wittmar DFMV Cold Ironing System™ is a Trademark of Wittmar Engineering and Construction, Inc.

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